

## NASI LEMAK PACKAGING: A CASE STUDY OF FOOD FRESHNESS AND DESIGN FLEXIBILITY

Maidin, S.<sup>1</sup>, Latiff, A.N.<sup>2</sup>

<sup>1,2</sup> Faculty of Manufacturing Engineering,  
Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian  
Tunggal, Melaka, Malaysia.

Email: \*<sup>1</sup>shajahan@utem.com.my; <sup>2</sup>bintiabdullatifnoorulain@gmail.com

**ABSTRACT:** *Nasi Lemak* with various types of packaging, is one of the most popular cuisines in Malaysia and is popular nowadays with a take away concept. This project has redesign the current *Nasi Lemak* packaging due to the current design lacks of flexibility and could not keep the *Nasi Lemak* fresh longer. Comparative experiment of three types of *Nasi Lemak* packaging was conducted to determine the freshness level of *Nasi Lemak* to determine the best packaging. Results shows that typical *Nasi Lemak* packaging using banana leaf and paper stay fresh longer due to its packaging that enabled air to flow. This study has also developed three concepts of *Nasi Lemak* packaging based on survey with 30 final year UTeM undergraduate students. From the survey, it can be concluded that there are several criteria that should be addressed in the concept generation of a new *Nasi Lemak* packaging. This include, the packaging should fit fork and spoon, transparent, good size and should be easy to carry. The study also applied eco design concept into the *Nasi Lemak* packaging. The third concept was selected as the final new design of *Nasi Lemak* packaging because from the design perspective it is easy to be packed as well as it is convenient to user with the incorporation of a fork and spoon holder. In addition, its advantage from the perspective of environmental due to utilisation of eco-friendly material. For future study, it is recommended to have a more effective testing on the redesigned prototype *Nasi Lemak* packaging to determine the freshness level of *Nasi Lemak*.

**KEYWORDS:** *Nasi Lemak Packaging Design, Freshness Study, Eco Design*

### 1.0 INTRODUCTION

*Nasi Lemak* is a traditional Malay food and one of the famous cuisines in Malaysia for ages. It is available at any time, especially for a breakfast menu. Indeed, *Nasi Lemak* is the most preferred breakfast choices. It consists of 5 'standard' ingredients namely rice, *sambal*, egg, slice of cucumber and fried anchovies with nuts. In English, a direct translation of *Nasi Lemak* is creamy rice, and 'creamy' refers to a creamy texture of the coconut milk which is the main ingredient for this cuisine. The rice is cooked and sometimes steamed with coconut milk. Another main ingredient is the *sambal* or sauce which ranges in terms of its spiciness. Figure 1 shows a typical *Nasi Lemak*.



Figure 1: A typical *Nasi Lemak*

As shown in Figure 1, *Nasi Lemak* is usually wrapped in a banana leaf, with a pyramid shape. *Nasi Lemak* is so famous that the demand for this traditional cuisine is very high. It is available

every day and everywhere in Malaysia at any time. Besides banana leaf, packaging such as polystyrene and plastic container are also used due to their size and flexibility.

A flexibility of the packaging which resembles a plate is the main attraction for this cuisine. The use of plastic container and polystyrene, for example, attracts people because a pair of fork and spoon can be inserted inside, to compare with a typical one which is wrapped in a banana leaf, in which a user needs to find his/her own fork and spoon. Nevertheless, this is not a problem for those who are used to using their hands to eat which is in accordance to a traditional Malay custom.

Furthermore, the freshness of this cuisine has raised a concern especially on a take-away basis. Some say it depends on the way one cooks the *Nasi Lemak*. In which a special technique is utilized to keep the freshness of *Nasi Lemak*. Others, say the freshness is influenced by the packaging itself. Lack of 'ventilation', may be the cause whereby the texture of the rice, when combined with the sambal and wrapped or packed for hours will definitely make it less fresh.

In short, the flexibility and freshness of *Nasi Lemak* packaging are the prime concerns of this study. Flexibility can be seen as the way people can manipulate the packaging. It could be in the way of portability, spaciousness in which to locate fork and spoon and ease of cleanliness and disposal. As for the freshness of food, a high ventilation should make the *Nasi Lemak* lasts longer.

## 2.0 PROBLEM STATEMENT

A typical packaging of *Nasi Lemak* cannot keep it fresh longer and this may cause food borne diseases [1]. Some of the packaging are able to last up to approximately 5 to 7 hours to keep the *Nasi Lemak* warm and fresh. Moreover, flexibility is also at stake for instead of eating in the packaging people require a plate, fork and spoon upon eating. Some people may eat *Nasi Lemak* using hand, which is a custom in Malaysia. However, some may require fork and spoon. A type of packaging that can fit fork and spoon using a non- biodegradable material is highly recommended as designing with eco- design criteria is an emerging trend nowadays.

## 3.0 AIMS, OBJECTIVES AND SCOPE

The aim of this study was to develop a new *Nasi Lemak* packaging that is more flexible and could retain its freshness longer and at the same time has an environmentally friendly design.

The objectives of this study were :

- to compare existing *Nasi Lemak* packaging design for their freshness.
- to redesign the current *Nasi Lemak* packaging for better user and eco friendly.

The scope of this study covers the flexibility of the packaging design, how it will keep the food fresh longer and the material use to produce the packaging. Any aspect regarding the ingredient of the food will not be covered.

## 4.0 LITERATURE REVIEW

### 4.1 Role of Food Packaging

The basic role of food packaging is to protect the inner content from outside influences such as bacteria, germs or anything that could affect the taste of the food. Apart from that, packaging is also used to protect the food from damages, to pack the food and also act as a medium of providing the consumers with ingredients and nutritional information [2]. In addition, food packaging must be cost- effective which satisfies requirements from selected industry and also

most importantly fulfil consumer desires. In short, the safety of the inside food and minimum environmental impact are essential.

#### **4.2 Material for Food Packaging**

The right selection of food packaging materials could maintain the product quality and freshness upon distribution. The common material used for food packaging includes glass, aluminium, laminates, paper and plastics. Nowadays, the food packaging combines the materials to manipulate the material functional and aesthetic properties.

#### **4.3 Package Design**

Packaging is one that protects, enhances and transports safely the content [3] and promotes products [4]. Packaging too should involve business activities that could attract customer. The product life cycle of the packaging should be studied starting from the raw material, production up to the disposal activities. Packaging is difficult in terms of the selecting the right material. Apart from that, it should have a sense of commercialism to attract customers' in buying the product[3]. Packaging has also been described as a 'complex, dynamic, scientific, artistic and controversial segment of business' [3]. The dynamic concept of packaging is deductive as it is subjected to "new materials. Therefore, new methods demand new machinery, new machinery results in better quality, and better quality opens up new markets which require changes in packaging" [3]. Therefore, in short, packaging aims to store, protects preserve and promote. In addition, packaging provides two more functions, selling and providing convenience. The decision-making should be considered in each stage of packaging design that has a financial implication on the package as decisions regarding environmental aspects have to be made as well.

#### **4.4 Colour of Packaging**

Designers often work in pencil, ink or other single color media at initial stages of package design. The advantage of this is to develop the designing process without any variables regarding color choice [4].

#### **4.5 Sustainable Packaging**

Incorporating eco-friendly features into the Nasi Lemak packaging design is a great way to sustain the environment, and these sustainable packaging designs showcase that an inventive eco branding can make a significantly bold impact. Infusing eco-friendly methods into Nasi Lemak packaging design is often the best way to visually engage and attract potential consumers which creatively distinguish them apart from other less eco conscious packaging designs.

### **5.0 METHODOLOGY**

Currently, many types of packaging exist for *Nasi Lemak*, be it polystyrene, plastic box, banana leaf and others. For the present study, the available and most commonly used packaging is selected for the experiment. The experiment focused on how long the food would last in the packaging. This is important to narrow down the packaging aspects so that any alteration or redesign can be done at a later stage. A number of three wraps of *Nasi Lemak* was bought from a stall. These *Nasi Lemak* was placed in three types of packaging as shown in Figure 2.

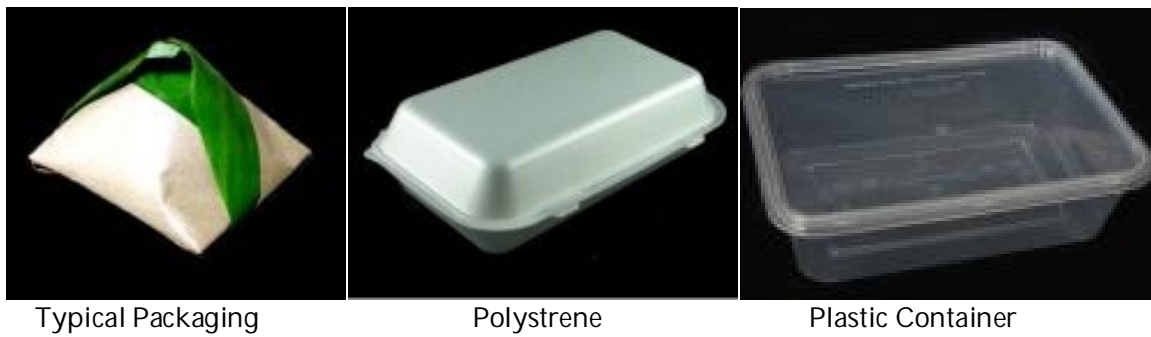


Figure 2: *Nasi Lemak* Packaging

The three *Nasi Lemak* packaging was left for 10 hours to test on how long will it last fresh. The three packaging was placed in a room temperature and was ensured not be affected by other exterior means that could influence the result. *Nasi Lemak* and the room temperature were fixed in this experiment. After a couple of hours, the *Nasi Lemak* was tested by observing, eating and smelling it to check the sign of freshness.

On the next stage of the study, a questionnaire survey was conducted with 30 final year undergraduate students of UTeM as they were found to enjoy *Nasi Lemak* for their breakfast. The survey contains mainly 2 parts which focus on the types of packaging the respondents preferred and their recommendation for a better packaging. The result of the survey will be discussed in the next section. The concept generation was conducted after surveying customers' needs. Concept screening was the method of gathering the entire concept from previous phase namely concept generation. Once the needs were determined, 3 concept generations were created. In short, this was the phase to design or redesign the packaging based on the survey results.

## 6.0 RESULT AND DISCUSSION

### 6.1 Survey

A questionnaire survey was conducted with 30 final year UTeM undergraduate students as they were found to enjoy *Nasi Lemak* for their breakfast. The survey contains mainly 2 parts which focuses on the types of packaging the respondents preferred and their recommendation for a better packaging. Table 1 shows the survey questions and the responses.

Table 1: The survey questions and the responses.

Question No:	Questions	Response
1	The first question ask the respondents most favoured types of packaging either the polystyrene, plastic container, typical one and a thinner plastic container.	The most favoured was the typical one which contains paper and banana leaf due to the smell from the banana leaf
2	The next question was related to the first question which asks the respondents if they are satisfied with the packaging they have selected.	All respondents are satisfied with the typical paper and banana leaf packaging.
3	The third question asks the	80% of the responses were the

	respondents on what criteria they want on the <i>Nasi Lemak</i> packaging.	packaging should be able to fit a fork and a spoon. While 70% of the responses favoured that it should be able to fit more <i>Nasi Lemak</i> .
4	The next question asks the respondents what changes should be made on the packaging.	The most responses were to have a separator between rice and dish. Next 60% of the students responded that to have an eco-friendly material for the packaging and the material should be able to be recycled. 80% of the responses were to have a flexible design that can be brought anywhere easily.
5	Moving on to the final question, the respondents were which type of packaging attract their attention more.	90% of them prefer transparent type of packaging.

From the survey above, it can be concluded that there are several criteria that should be addressed in the concept generation of newly redesigned *Nasi Lemak* packaging this study will focus. This include, the packaging should fit fork and spoon, transparent, have good size and portable.

## 6.2 The Experiment for Food Freshness

The experiment for the food freshness was conducted using *Nasi Lemak* and room temperature as the fixed variables. The manipulated variable was type of packaging used and the responding variable was the freshness of the food. Table 2 below shows the result from the experiment.

Table 2: The Experiment Result

Types of Packaging	Observation				
	2 hour	4 hour	6 hour	8 hour	10 hour
Typical Wrap (Paper and banana leaf)	Looks good, smells good	Looks good, smells good	Looks good, smells good	Looks good, smells good	Looks good, smells good
Plastic container	Looks good, smells good	Looks good, smells good	Looks sweating, smells bad	-	-
Polystyrene	Looks good, smells good	Looks good, smells good	Looks good, smells good	Looks good, smells good	-

A typical *Nasi Lemak* packaging wrapped in a banana leaf lasted longer in comparison with the other types of packaging due to the fact that the packaging had an open air flow that enabled the *Nasi Lemak* to 'breathe'. On the other hand, plastic container had the least number of freshness times, which was 6 hours only. This is due to evaporation occurred caused by lack of air flow in the container.

### 6.3 Concept Generation

Figure 3 shows three concept sketches generated based from the results of the survey:

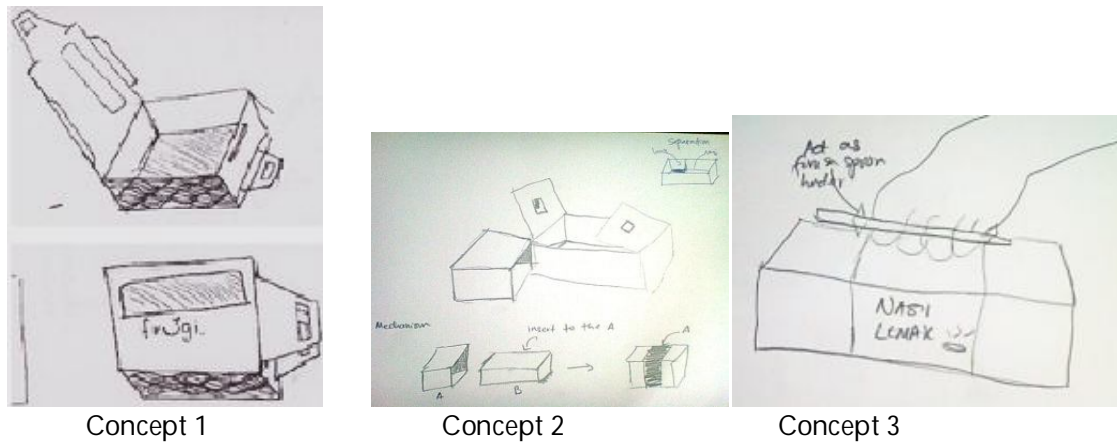


Figure 3: *Nasi Lemak* packaging concept sketches

The selected concept was the 3rd concept. It was chosen through concept scoring method. This concept was chosen due to its better design feature that made it convenience to pack *Nasi Lemak* and an incorporation of a holder to hold fork and spoon. The next step was to produce the prototype. A typical paper was used to develop the prototype. The material selection plays an important role. It is best to select material that is easy to recycle or dispose and most importantly biodegradable to gear toward sustainability. Sustainability of a product is derived from the material. The material needs to be the one that can be consumed and get easily. In other words, it will not interfere in the future needs. As a product to pack food items, the material must be safe and free from hazards of chemical reactions. In addition, the number of parts is also important upon redesigning new product. In design for environment concept, the lesser the part the better it is. Figure 4 shows the the prototype.



Figure 4: *Nasi Lemak* packaging prototype

### 7.0 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the packaging of *Nasi Lemak* was successfully redesigned and far better than the typical one following the criteria selected for this project; size that can fit more *Nasi Lemak* and fork and spoon, an eco-friendly material and an air flow access to ensure a longer freshness. The packaging was redesigned based on user survey, resulting in 3 concepts being used in the scoring method. Moreover, the freshness of the food was determined through experimental method. From the experiment, the packaging that can last longer was inspected to search for the concept that can make the food fresh longer. A typical *Nasi Lemak* packaging wrapped in a banana leaf lasted longer in comparison with the other types of packaging due to the fact that the packaging had an open air flow that enabled the food to 'breathe'.

This study would significantly benefit from the perspective of environmental sustainable due to utilisation of eco-friendly material by using the typical paper. From the design perspective the redesigned *Nasi Lemak* packaging is easy to be packed by anyone as well as it is convenient to user with the incorporation of a holder to hold fork and spoon.

For future work, it is recommended to determine the freshness level of the *Nasi Lemak* redesigned *Nasi Lemak* packaging. In addition, a shred testing could also be done in order to test the hardness of the packaging. It is also recommended to have a computerized food freshness tester for a better comparative study.

## **ACKNOWLEDGMENTS**

The author are grateful to all individuals and parties who have assisted whether direct or indirectly during the author's completion of this project at the Universiti Teknikal Malaysia Melaka.

## **REFERENCES**

- [1] *Foodborne Diseases: Prevalence of Foodborne Diseases in South East and Central Asia*, Encyclopedia of Food Safety, Waltham, Academic Press, 2014, 287-294.
- [2] Guidance for industry: Current good manufacturing practice in manufacturing, packaging, labeling, or holding operations for dietary supplements; Small entity compliance guide, 2010.
- [3] A. Brody, "Packaging by the numbers," *Food Tech*, 62, 2, pp. 89-91, 2008.
- [4] D. Manish,. "Shelf-life and kinetics of quality change of dried pomegranate arils in flexible packaging," *Food Packaging and Shelf Life*, pp. 1-6, 2013.
- [5] L.K. Yam, *The Wiley Encyclopedia of Packaging Technology*, United States of America: Wiley, 2009.
- [6] A. C. S. Pires, N. F. F. Soares, N. J. Andrade, L. H. M. Silva, G. P. Camilloto, and P. C. Bernardes, " Development and evaluation of active packaging for sliced Mozzarella preservation," *Packaging Technology and Science*, 21, pp. 375-383, 2008.
- [7] S. Michele, A.C.S. Piresa, H.M.P. Sant'Anab, N. F.F. Soaresc, A.F. Carvalho, "Influence of multilayer packaging and microfiltration process on milk shelf life," *Food Packaging and Shelf Life*, pp. 151-159, 2014.
- [8] W. Jedlička, *Packaging Sustainability: Tools, Systems and Strategies for Innovative Package Design*, United States of America:Wiley, 2009.